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**Akino**

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(54) **VOLUME REDUCTION FILLING MEMBER FOR MICROPHONE AND UNIDIRECTIONAL CONDENSER MICROPHONE INCORPORATING THE SAME**

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***H04R 19/04*** (2006.01)
*H04R 3/00* (2006.01)

(52) **U.S. Cl.**
CPC ..... ***H04R 19/04*** (2013.01)

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USPC ..... 381/111, 113, 104, 355, 356, 361, 363, 381/369, 174; 704/233
See application file for complete search history.

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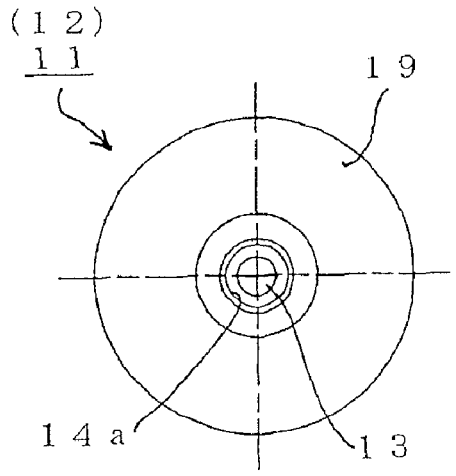
(57) **ABSTRACT**

A microphone includes a volume reduction filling member therein. The volume reduction filling member includes an elastic body having an insertion hole for inserting an electrode extraction member which extracts a generated current to a back end side by contacting a front end side thereof to a fixed electrode of a microphone unit, and reducing a volume inside a unit case. The elastic body is divided into a tip-side main body portion and a base-end-side flexible flange portion through a circular groove around the insertion hole from an outer peripheral face side of a base end portion thereof. When an outer peripheral edge portion of the base-end-side flexible flange portion receives an equal pressure toward a tip direction so as to bend, the elastic body concentrates a stress into a front portion side of the insertion hole through the tip-side main body portion.

**5 Claims, 4 Drawing Sheets**



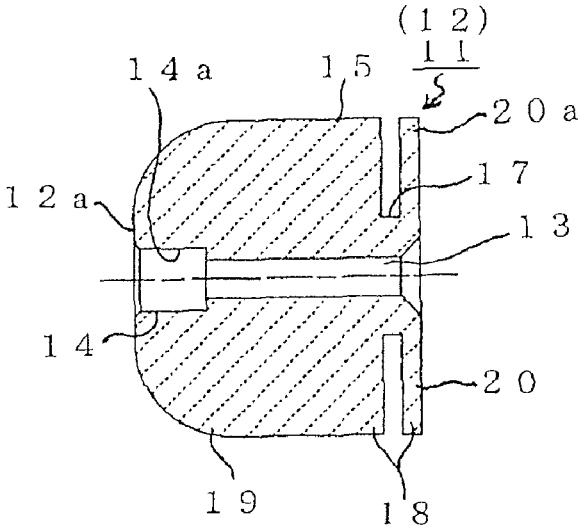



Fig. 1(a)

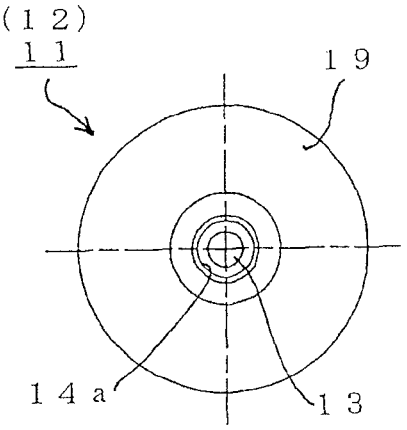



Fig. 1(b)

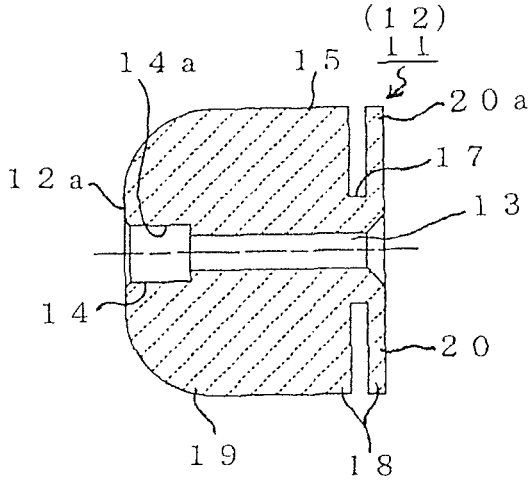



Fig. 2(a)

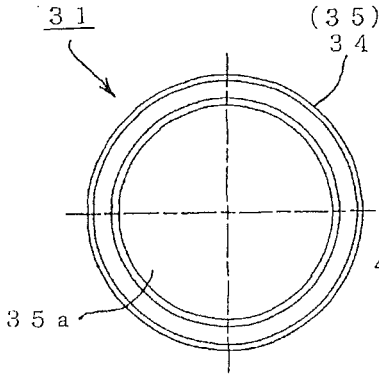



Fig. 2(b)

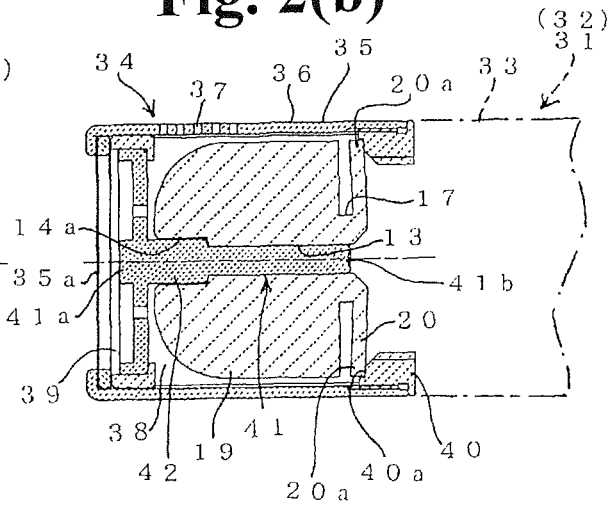
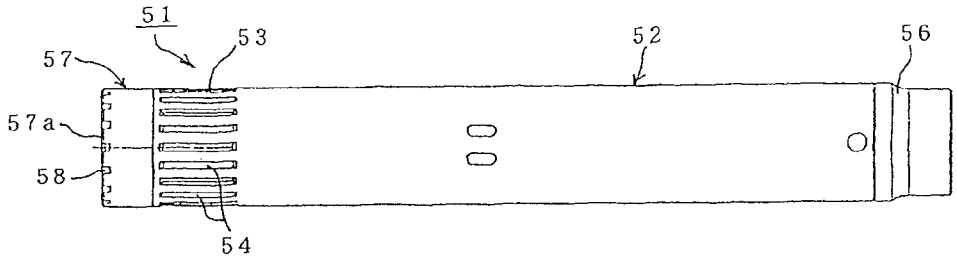


Fig. 3(a) Prior Art



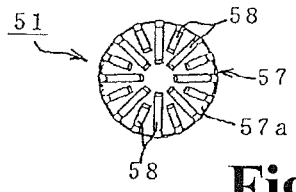




Fig. 3(b) Prior Art

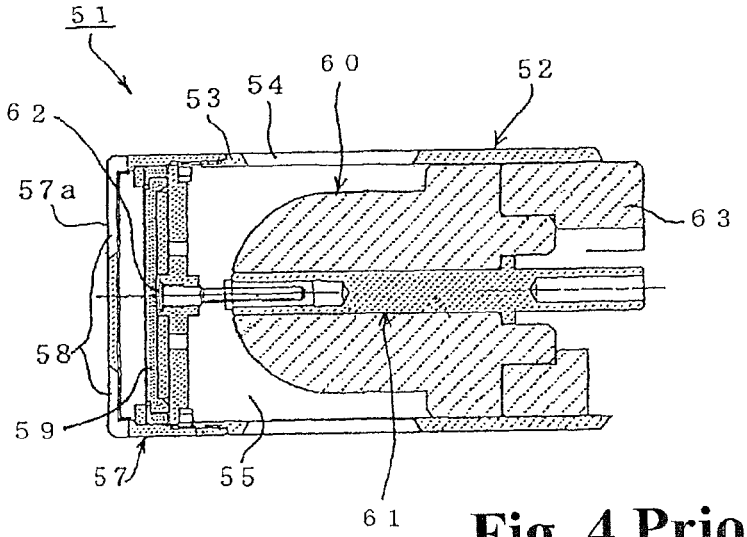



Fig. 4 Prior Art

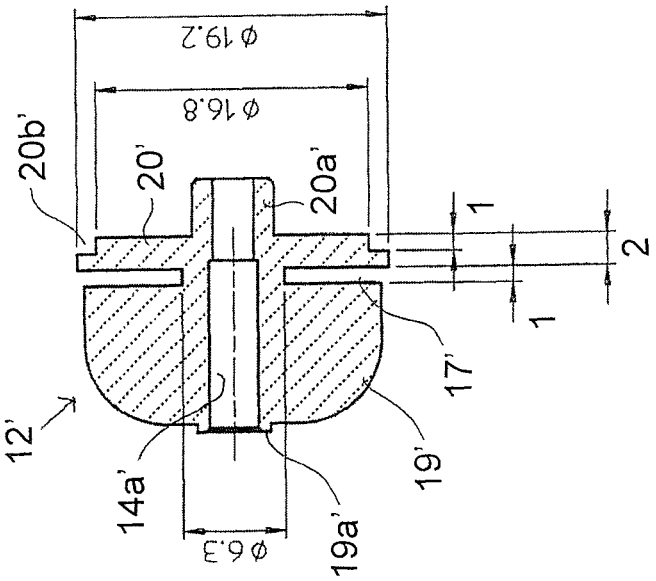



Fig. 5(b)

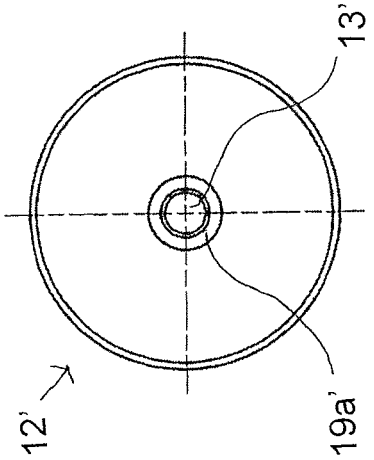



Fig. 5(a)

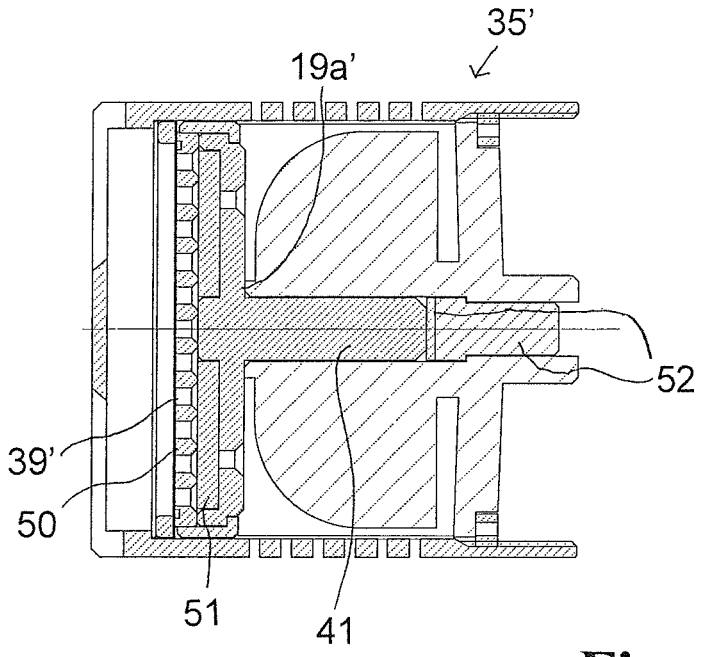



Fig. 6

# VOLUME REDUCTION FILLING MEMBER FOR MICROPHONE AND UNIDIRECTIONAL CONDENSER MICROPHONE INCORPORATING THE SAME

## BACKGROUND OF THE INVENTION AND RELATED ART STATEMENT

The present invention relates to a volume reduction filling member for a microphone for preventing a generation of a cavity resonance of a unidirectional condenser microphone, and a unidirectional condenser microphone incorporating the same.

Generally, a condenser microphone unit is formed by a unit case whose one face includes a front acoustic terminal as a sound introduction hole and is closed, whereas a female screw is incised on an inner periphery face of an open end portion dividing the other open face. In an order starting from a front acoustic terminal side inside the unit case toward the open end portion, a diaphragm ring including a diaphragm; a spacer ring; and a fixed electrode and an insulating seat relative to the diaphragm are housed. A lock ring is screwed through a male screw screwed into the female screw on a back face of the insulating seat, so that the fixed electrode can be pressed and fixed to a diaphragm ring side through the insulating seat with a predetermined pressure.

FIG. **3**(*a*) and FIG. **3**(*b*) are explanatory drawings showing one example of a unidirectional cylindrical condenser microphone formed by housing the conventional condenser microphone unit as mentioned above inside a cylindrical body, wherein FIG. **3**(*a*) shows a right side view, and FIG. **3**(*b*) shows a front view, respectively.

According to the aforementioned figures, a unidirectional condenser microphone **51** is formed by a microphone cylindrical body **52** including rear acoustic terminals **54** on a peripheral face of a front end portion **53** thereof; and a condenser microphone unit **57** including front acoustic terminals **58** on a tip face **57***a* and screwed and disposed on a front end side of the microphone cylindrical body **52**.

Also, inside the microphone cylindrical body **52**, there is disposed a circuit substrate (not shown in the figures) electrically connected to an output connector portion housed and disposed on a back end portion **56** side thereof in a state wherein a tip portion side thereof is held by a holding member.

Namely, inside the cylindrical body **52**, a space for housing and disposing an electronic circuit member including the circuit substrate is required. As a result, after the electronic circuit member and the circuit substrate are disposed at predetermined positions, at portions where the rear acoustic terminals **54** are positioned, there remain a cavity communicating with outside air through the rear acoustic terminals **54**.

Then, the cavity operates as an acoustic capacity, so that in the rear acoustic terminal **54**, there is an acoustic mass. Therefore, a resonance is generated so as to have a problem of deteriorating a directional frequency response.

FIG. **4** depicts FIG. 1(*a*) in Japanese Patent Application Publication No. 2011-9807 proposed in order to solve the problem mentioned above. Inside a cavity **55** of the microphone cylindrical body **52** in the unidirectional condenser microphone **51**, there is disposed a volume reduction filling member **60** for a microphone. Also, the volume reduction filling member **60** for a microphone is supported in a holding member **63**. In a center axis direction of the volume reduction filling member **60** for a microphone, there is fixed and disposed an electrode extraction member **61**. The electrode extraction member **61** presses a fixed electrode **59** side forming the condenser microphone unit **57**. The volume reduction filling member **60** for a microphone is housed and disposed inside the cavity **55** in order to reduce a volume of the microphone cylindrical body **52** so as to raise a resonance frequency to a high frequency. Incidentally, in front (a left side of FIG. **4**) of the fixed electrode **59**, there is attached a diaphragm ring including a spacer ring and a diaphragm, which faces the fixed electrode **59** (not shown in the figure). The fixed electrode **59** and the diaphragm are disposed at a predetermined interval.

However, the volume reduction filling member **60** for a microphone shown in Japanese Patent Application Publication No. 2011-9807 is formed by a hard plastic sintered porous body. Therefore, in the conventional unidirectional condenser microphone, there is an inconvenience that it is difficult to concentrate a stress in such a way as to uniformly press a unit component member side against an opposite center portion **62**.

In view of the aforementioned problem of a conventional technology, the present invention has an object of providing a volume reduction filling member for a microphone which can uniformly press by concentrating the stress on a fixed electrode side while preventing the generation of the cavity resonance of the unidirectional condenser microphone. Moreover, the present invention has an object of providing a unidirectional condenser microphone unit incorporating the volume reduction filling member for a microphone.

Further objects and advantages of the invention will be apparent from the following description of the invention.

## SUMMARY OF THE INVENTION

The present invention is made in order to attain the aforementioned objects, and main characteristics of the first aspect of the invention (a volume reduction filling member for a microphone) is that the volume reduction filling member for a microphone comprises an elastic body including an insertion hole for inserting and disposing an electrode extraction member which extracts a generated current to a back end side by contacting a front end side thereof in a center axis direction of a fixed electrode forming a unit built-in member inside a unit case in a condenser microphone unit detachably screwed and disposed in a front end portion of a microphone cylindrical body, and volume-reducibly disposed inside the unit case together with the electrode extraction member; that the elastic body is divided into a tip-side main body portion and a base-end-side flexible flange portion by a circular groove having an equal width and depth around an axis direction orthogonal to a length direction of the insertion hole from an outer peripheral face side of a base end portion thereof; and that when an outer peripheral edge portion of the base-end-side flexible flange portion receives an equal pressure toward a tip direction so as to bend, the elastic body is formed so as to concentrate a stress into a front portion side of the insertion hole through the tip-side main body portion.

In a second aspect, preferably, the insertion hole has a diameter expansion portion engaging with a large diameter portion that the electrode extraction member provides, and controlling a movement thereof on the front portion side.

Also, the main characteristics of a third aspect of the invention (a unidirectional condenser microphone) is that the unidirectional condenser microphone comprises a microphone cylindrical body incorporating an electronic circuit member; and a condenser microphone unit detachably attached to a front end portion of the microphone cylindrical body through a unit case including a front acoustic terminal on a tip face, and a rear acoustic terminal on a peripheral face of a front end

portion. Also, in the unidirectional condenser microphone, an internal capacity of a cavity ensured inside the unit case is reduced by the volume reduction filling member for a microphone supported through the support ring connecting the unit case and the microphone cylindrical body. As for the volume reduction filling member for a microphone, the elastic body according to the first or second aspect is used, and in the elastic body, the electrode extraction member, which extracts a generated current to a back end side by contacting a front end side thereof in a center axis direction of the fixed electrode housed inside the unit case and forming a unit built-in member, is inserted into the insertion hole so as to be housed and disposed inside the unit case, so that when the outer peripheral edge portion of the base-end-side flexible flange portion receives an equal pressure from the support ring so as to bend, the stress concentrates into the front end of the electrode extraction member through the insertion hole on a tip-side main body portion so as to uniformly and stably press relative to the unit built-in member including the fixed electrode contacting with the front end.

In a fourth aspect, preferably, the support ring is formed by including an annular concave portion in which the outer peripheral edge portion can be fitted at an abutment portion against the outer peripheral edge portion of the flexible flange portion.

According to the first aspect of the invention (the volume reduction filling member for a microphone), the elastic body is divided into the tip-side main body portion and the base-end-side flexible flange portion through the circular groove having the equal width and depth around the axis direction orthogonal to the length direction of the insertion hole from the outer peripheral face side of the base end portion thereof, so that when an equal pressure toward a front end direction is applied to the outer peripheral edge portion of the base-end-side flexible flange portion so as to bend, the stress can be concentrated on the front portion of the insertion hole through the tip-side main body portion.

According to the second aspect of the invention, in the insertion hole, the diameter expansion portion engaging with the large diameter portion that the electrode extraction member provides, and controlling the movement thereof is provided on the front portion side thereof, so that the diameter expansion portion and the large diameter portion are engaged with each other, and the electrode extraction member is stably positioned so as to be inserted and disposed.

According to the third aspect of the invention (the unidirectional condenser microphone), as the volume reduction filling member for the microphone, the elastic body according to the first or second aspect is used, so that in a state wherein the electrode extraction member, which extracts the generated current to the back end side by contacting the front end side thereof in the center axis direction of the fixed electrode, is inserted and disposed through the insertion hole, the electrode extraction member is disposed inside the unit case, and then, when the equal pressure toward the tip direction is applied to the outer peripheral edge portion of the base-end-side flexible flange portion by the support ring so as to bend a base-end-side flexible flange portion side, the stress can be concentrated on the front end of the electrode extraction member, and the pressure can be uniformly and stably applied relative to a unit built-in member including a fixed electrode contacting with the front end, so that an excellent stable performance of unidirectional characteristics can be provided to the condenser microphone unit.

According to the fourth aspect of the invention, in the support ring, the annular concave portion in which the outer peripheral edge portion fits is provided at the abutment portion against the outer peripheral edge portion of the base-end-side flexible flange portion, so that through the annular concave portion, the equal pressure can be applied more reliably relative to a whole periphery of the outer peripheral edge portion of the base-end-side flexible flange portion in the elastic body.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**(*a*) and **1**(*b*) are explanatory drawings showing one example of a volume reduction filling member for a microphone according to the first invention, wherein FIG. **1**(*a*) shows a front view, and FIG. **1**(*b*) shows a right vertical cross-sectional view, respectively;

FIGS. **2**(*a*) and **2**(*b*) are explanatory drawings showing one example of a unidirectional condenser microphone according to a second invention by omitting a part thereof, wherein FIG. **2**(*a*) shows a front view, and FIG. **2**(*b*) shows a right vertical cross-sectional view, respectively;

FIGS. **3**(*a*) and **3**(*b*) are explanatory drawings showing an example of a general external configuration of the unidirectional condenser microphone including the present invention, wherein FIG. **3**(*a*) shows a right side view, and FIG. **3**(*b*) shows a front view, respectively;

FIG. **4** is a drawing of FIG. 1(*a*) in Japanese Patent Application Publication No. 2011-9807;

FIGS. **5**(*a*) and **5**(*b*) are explanatory drawings showing a second example of a volume reduction filling member for a microphone according to the invention, wherein FIG. **5**(*a*) shows a front view, and FIG. **5**(*b*) shows a right vertical cross-sectional view, respectively; and

FIG. **6** is a vertical cross-sectional view, similar to FIG. **2**(*b*), showing the second example of a unidirectional condenser microphone according to a second invention by omitting a part thereof.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A volume reduction filling member for a microphone according to the first invention shown in FIGS. **1**(*a*) and **1**(*b*) is implemented by being incorporated in a unidirectional condenser microphone according to a second invention as shown in FIGS. **2**(*a*) and **2**(*b*). Therefore, embodiments will be explained hereinafter with reference to FIGS. **1**(*a*), **1**(*b*), **2**(*a*), and **2**(*b*) while considering FIGS. **3**(*a*) and **3**(*b*) showing an example of a general external configuration of the unidirectional condenser microphone as well.

A volume reduction filling member **11** for a microphone is disposed inside a cavity **38** of a unit case **35** as shown in FIGS. **2**(*a*) and **2**(*b*) so as to reduce an internal capacity thereof. The volume reduction filling member **11** for a microphone is formed as an elastic body **12** made of, for example, a silicone rubber and the like.

A condenser microphone unit **34** is detachably screwed and disposed in a front end portion **33** of a microphone cylindrical body **32** through a support ring **40**. Inside the unit case **35** of the microphone unit **34**, there is disposed an electrode extraction member **41**. The electrode extraction member **41** detects a voltage at a back end **41***b* side by contacting a front end **41***a* side with a fixed electrode **39** in a center axis direction of the fixed electrode **39**. The elastic body **12** is formed to include an insertion hole **13**. The insertion hole **13** is provided for inserting and disposing the electrode extraction member **41**.

In that case, the insertion hole **13** is formed to have a diameter expansion portion **14***a* on a front portion **14** side thereof. The diameter expansion portion **14***a* engages a large

diameter portion **42** that the electrode extraction member **41** is provided with on the front end **41***a* side. Therefore, through the diameter expansion portion **14***a*, the insertion hole **13** can control a movement of the electrode extraction member **41**.

Also, the elastic body **12** is formed to have an appropriate shape and volume such as an approximately column shape whose diameter is, for example, slightly smaller than an inner diameter of the unit case **35**, and the like. When the elastic body **12** is disposed inside the cavity **38** of the unit case **35** together with the electrode extraction member **41** inserted and disposed through the insertion hole **13**, the elastic body **12** can be substantially reduced according to a desired internal capacity thereof.

Also, the elastic body **12** includes a circular groove **17** having an equal width and depth around an axis direction orthogonal to a length direction of the insertion hole **13** from an outer peripheral face **15** side of a base end portion **18** thereof. The elastic body **12** is formed by being divided into a tip-side main body portion **19** and a base-end-side flexible flange portion **20** through the circular groove **17**.

Consequently, as shown in FIGS. **2**(*a*) and **2**(*b*), an outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** receives an equal pressure toward a tip **12***a* direction so as to bend. At that time, the elastic body **12** concentrates a stress on the front portion **14** side of the insertion hole **13** through the tip-side main body portion **19**.

The volume reduction filling member **11** may be formed by PPS (Polyphenylene sulfide), i.e. integrally molding PPS. PPS may be, for example, MK124 made by Sumitomo Bakelite Co. Ltd. MK124 shows flex strength of 208 (MPa) and flex elasticity of 12 (Gpa). In the present embodiment, MK124 is used, but it is possible to select other materials according to the requirement of the microphone.

On the other hand, a unidirectional condenser microphone **31** according to the second invention shown in FIGS. **2**(*a*) and **2**(*b*) is formed by including the microphone cylindrical body **32** incorporating an electronic circuit member which is not shown in the drawings, and the condenser microphone unit **34** detachably attached to a front end portion **33** side of the microphone cylindrical body **32** through the unit case **35**. The unit case **35** includes a front acoustic terminal (not shown in the figures) formed in a tip face **35***a*, and a back acoustic terminal **37** formed in a peripheral face **36**. Incidentally, the microphone cylindrical body **32** and the condenser microphone unit **34** shown in FIGS. **2**(*a*) and **2**(*b*) can be integrally connected by the support ring **40** screwed and disposed inside the unit case **35**. Outside the support ring **40** and inside the microphone cylindrical body **32**, there are formed screw portions in such a way as to be screwed to each other, and the support ring **40** and the microphone cylindrical body **32** can be fitted by turning the support ring **40**.

Also, the internal capacity of the cavity **38** retained inside the unit case **35** is substantially reduced by the volume reduction filling member **11** for a microphone supported inside the unit case **35** through the support ring **40**.

In that case, as the volume reduction filling member **11** for a microphone, there is used an elastic body according to aspect **1** or **2**, i.e., the elastic body **12** divided into the tip-side main body portion **19** and the base-end-side flexible flange portion **20** through the circular groove **17**.

Also, the elastic body **12** is housed and disposed inside the unit case **35** by inserting the electrode extraction member **41** into the insertion hole **13**. The electrode extraction member **41** detects the voltage at the back end **41***b* side by contacting the front end **41***a* side thereof with the fixed electrode **39** forming a unit built-in member in the center axis direction of the fixed electrode **39**.

The outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** receives an equal pressure from the support ring **40** so as to bend, so that the stress concentrates into the front end **41***a* side of the electrode extraction member **41** through the insertion hole **13** on a tip-side main body portion **19** side. Therefore, the aforementioned unit built-in member side including the fixed electrode **39** which contacts with the front end **41***a* side can be uniformly and stably pressed. Incidentally, in front (a left side of FIG. **2**(*b*)) of the fixed electrode **39**, there is attached a diaphragm ring facing the fixed electrode **39** and including a spacer ring and a diaphragm (not shown in the figure). The diaphragm ring is disposed such that the diaphragm faces the fixed electrode **39** at a predetermined interval.

Next, an operation of the present invention comprising the aforementioned structure will be explained. In the elastic body **12** as the volume reduction filling member **11** for a microphone (the first invention), the back end **41***b* side of the electrode extraction member **41** is inserted from the front portion **14** side of the insertion hole **13**, so that the electrode extraction member **41** is disposed. In a case wherein the insertion hole **13** includes the diameter expansion portion **14***a* on the front portion **14** thereof, and the electrode extraction member **41** includes the large diameter portion **42** on the front end **41***a* side thereof, respectively, the diameter expansion portion **14***a* and the large diameter portion **42** are engaged with each other, and the electrode extraction member **41** is stably positioned so as to be inserted and disposed.

Thus, the elastic body **12** after the electrode extraction member **41** is inserted and disposed is housed inside the cavity **38** retained inside the unit case **35**.

In the unit case **35** after the elastic body **12** is housed, the support ring **40** is disposed and screwed. Thereafter, the support ring **40** is rotated in an extrusion direction, so that the elastic body **12** is positioned and fixed in a state wherein the outer peripheral edge portion **20***a* thereof is bent toward a tip **12***a* side.

Furthermore, when an annular concave portion **40***a* is provided in the support ring **40**, the annular concave portion **40***a* and the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** can be fitted to each other. Consequently, a pressure can be uniformly applied at a whole periphery of the peripheral edge portion **20***a*.

Also, the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** is bent so as to concentrate the stress into the front portion **14** side of the insertion hole **13** through the tip-side main body portion **19**. Consequently, by using the elastic body **12**, the stress can be concentrated into the front end **41***a* side of the electrode extraction member **41** inserted and disposed in the insertion hole **13** as well.

Moreover, the front end **41***a* of the electrode extraction member **41** contacts with the fixed electrode **39** forming the unit built-in member in the center axis direction thereof. Consequently, the pressure can be uniformly and stably applied relative to the unit built-in member side inside the unit case **38**.

The elastic body **12** is divided into the tip-side main body portion **19** and the base-end-side flexible flange portion **20** through the circular groove **17** having the equal width and depth around the axis direction orthogonal to the length direction of the insertion hole **13** from the outer peripheral face **15** side of the base end portion **18** thereof. Consequently, according to the first aspect of the invention (the volume reduction filling member for a microphone), a pressure toward the tip **12***a* direction is uniformly applied to the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20**, and the base-end-side flexible flange portion **20** is bent so

as to concentrate the stress into the front portion **14** side of the insertion hole **13** through the tip-side main body portion **19** side.

Also, the diameter expansion portion **14***a*, which engages with the large diameter portion **42** provided in the electrode extraction member **41**, and which controls the movement thereof, is provided on the front portion **14** side of the insertion hole **13**, so that the diameter expansion portion **14***a* and the large diameter portion **42** are engaged with each other so as to stably position the electrode extraction member **41** and to allow the electrode extraction member **41** to be inserted and disposed.

On the other hand, according to the second aspect of the invention (the unidirectional condenser microphone), relative to the condenser microphone unit **34**, excellent unidirectional characteristics can be stably provided. As for the volume reduction filling member **11** for a microphone, the elastic body **12** according to the first and second aspects is used so as to uniformly and stably apply the pressure relative to the unit built-in member side. More specifically, the electrode extraction member **41** detects the voltage at the back end **41***b* by contacting the front end **41***a* side with the elastic body **12** in the center axis direction of the fixed electrode **39**. Furthermore, the electrode extraction member **41** is inserted and disposed inside the unit case **35** through the insertion hole **13**. By the support ring **40**, the pressure toward the tip **12***a* direction is uniformly applied to the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20**. By that pressure, a base-end-side flexible flange portion **20** side bends, and the stress concentrates on the front end **41***a* side of the electrode extraction member **41**. Therefore, the pressure is uniformly and stably applied relative to the unit built-in member side including a fixed electrode **39** side which contacts with the front end **41***a* side.

Furthermore, in the support ring **40**, there can be provided the annular concave portion **40***a* fitted in the outer peripheral edge portion **20***a* at an abutment portion against the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20**. In that case, the pressure can be uniformly applied relative to the whole periphery of the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** in the elastic body **12** more reliably through the annular concave portion **40***a*.

A second embodiment of the invention is explained with reference to FIGS. **5**(*a*), **5**(*b*) and **6**.

The elastic body **12'** in the second embodiment includes a tip-side main body portion **19'** and the base-end-side flexible flange portion **20'** through a circular groove **17'** having the equal width and depth, similar to the elastic body **12**. However, the tip side main body portion **19'** includes a front projection **19***a'* around an insertion hole **13'** with a diameter expansion portion **14***a'* slightly longer than that of the first embodiment, and a rear projection **20***a'* is formed at a side opposite to the front projection **19***a'*. Also, the base-end-side flexible flange portion **20'** has an annular step **20***b'*, and extends radially outwardly beyond the tip-side main portion **19'**.

The numerals shown in FIG. **5**(*b*) are actual sizes (mm) of the elastic body **12'** as examples. The sizes will be changed according to the size of the microphone to be used.

FIG. **6** shows a condition where the elastic body **12'** is installed in a unit case **35'** of a unidirectional microphone. The elastic body **12'** is arranged around the electrode extraction member **41**, and is placed behind the fixed electrode **39'** through a fixed pole **50** so that the flange portion **20'** is pressed to the fixed electrode by a support ring **40'**. In this embodiment, a filler **51** is interposed between the fixed pole **50** and the electrode extraction member **41**, and two extension members **52** are disposed in the hole behind the electrode extraction member **41**. The other structure is the same as that of the first embodiment.

In the embodiment as shown in FIG. **6**, the pressure applied by the support ring **40'** can be concentrated at the front projection **19***a'*.

According to the first aspect of the invention (the volume reduction filling member for a microphone), a pressure toward the tip **12***a* direction is uniformly applied to the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20**, and the base-end-side flexible flange portion **20** is bent so as to concentrate the stress into the front portion **14** side of the insertion hole **13** through the tip-side main body portion **19** side.

The second embodiment of the present invention can provide the same effect as in the first embodiment.

Hereinabove, the present invention has been explained based on an illustrated example, and a specific structure thereof is not limited to the example described hereinabove. For example, a cross-sectional shape of the tip-side main body portion **20** in the elastic body **12** is not limited to the illustrated example, and can be appropriately selected provided that the cross-sectional shape has a shape wherein the outer peripheral edge portion **20***a* of the base-end-side flexible flange portion **20** can concentrate the pressure received from the support ring **40** into the tip **12***a* side of the elastic body **12** as the stress.

The disclosure of Japanese Patent Application No. 2013-267342, filed on Dec. 25, 2013, is incorporated in the application.

While the invention has been explained with reference to the specific embodiments of the invention, the explanation is illustrative and the invention is limited only by the appended claims.

What is claimed is:

**1**. A volume reduction filling member for a microphone, comprising:

an elastic body adapted to be disposed in a unit case of a condenser microphone unit and including an insertion hole extending in a center axis direction thereof, for inserting and disposing an electrode extraction member which extracts a generated current to a back end side, the elastic body reducing a volume inside the unit case together with the electrode extraction member,

the elastic body comprising:

a tip-side main body portion,

a base-end-side flexible flange portion, and

a circular groove dividing the elastic body into the tip-side main body portion and the base-end-side flexible flange portion, the circular groove having an equal width and depth around the insertion hole and extending orthogonal to a length direction of the insertion hole from an outer peripheral face near a base end portion thereof so that when an outer peripheral edge portion of the base-end-side flexible flange portion receives an equal pressure toward a tip direction and bends, a stress is concentrated into a front portion of the tip-side main body portion around the insertion hole.

**2**. A volume reduction filling member for a microphone according to claim **1**, wherein the insertion hole includes a diameter expansion portion at the front portion adapted to engage a large diameter portion of the electrode extraction member to control a movement thereof.

3. A unidirectional condenser microphone, comprising:

a condenser microphone unit including a cylindrical body, a unit case with an acoustic terminal, and an internal capacity in the unit case;

a support ring disposed in the condenser microphone unit and connecting the unit case and the cylindrical body;

a fixed electrode disposed inside the unit case;

an electrode extraction member disposed inside the unit case and contacting the fixed electrode for extracting a generated current to a back end side; and

a volume reduction filling member disposed in the internal capacity to reduce a volume inside the unit case together with the electrode extraction member, and comprising an elastic body, said elastic body including:

an insertion hole, extending in a center axis direction, for inserting and disposing the electrode extraction member,

a tip-side main body portion,

a base-end-side flexible flange portion, and

a circular groove dividing the elastic body into the tip-side main body portion and the base-end-side flexible flange portion, the circular groove having an equal width and depth around the insertion hole and extending orthogonal to a length direction of the insertion hole from an outer peripheral face near a base end portion thereof so that when an outer peripheral edge portion of the base-end-side flexible flange portion receives an equal pressure toward a tip direction and bends by the support ring, a stress is concentrated into a front portion around the insertion hole through the tip-side main body portion to uniformly and stably press the fixed electrode contacting with the electrode extraction member.

4. A unidirectional condenser microphone according to claim 3, wherein the support ring includes an annular concave portion in which an outer peripheral edge portion of the base-end-side flexible flange portion is fitted, at an abutment portion against the outer peripheral edge portion of the base-end-side flexible flange portion.

5. A unidirectional condenser microphone according to claim 3, wherein the insertion hole includes a diameter expansion portion at the front portion, and

the electrode extraction member includes a large diameter portion disposed in the diameter expansion portion to control a movement thereof.

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